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IMPLEMENTATION OF LESSON STUDY IN LEARNING SETS THROUGH THE INTERACTION OF LIVING THINGS WITH THE ENVIRONMENT

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Abstract

The purpose of this activity is to observe the learning process in relation between learning materials, students and teachers interaction and interactions among students in learning through the implementation of lesson study. In general, this activity is a collaboration among the University of Muhammadiyah Semarang, the Regional Leadership of Muhammadiyah Central Java and all Muhammadiyah schools in Central Java from July to September 2021. In particular, this activity was held at Muhammadiyah Plus Junior High School Salatiga in August 2021. Lesson study based on The school was participated by mathematics and science teachers at Muhammadiyah Plus Junior High School Salatiga based on the following stages: (1) planning (plan), (2) implementation (do), and (3) reflection (see). Mathematics and science teachers carry out lesson plans by making chapter designs and lesson designs. The implementation of lesson study at Muhammadiyah Plus Junior High School Salatiga based on integrated learning which applied in group learning through the interaction of living things with the environment. Furthermore, there is a reflection towards implementation stages and find to solve the problem happened so that the next learning can be carried out properly.

Keywords: Sets, Interaction, Lesson Study, Living Things

1. PRELIMINARY

The COVID-19 pandemic has brought about many changes in the world of education. One of them is the development of the ability to use teacher technology to carry out the teaching and learning process for students. Training, seminars, and various activities are followed by teachers to develop their competencies in order to achieve good quality of learning process in all situations. Teachers should be master four teacher competencies, they are pedagogic competence, personality competence, professional competence, and social competence according to Permendiknas No 16 2007. These competencies support teachers as learning agents who play important as facilitators, creator of learning system, and give inspiration for students to create fun and quality learning. As learning agent, a teacher should keep learning and develop the competencies so that he/she can be a quality teacher. One of supporting activities is by joining in a lesson study which is held by University of Muhammadiyah Semarang in collaboration with PWM Central Java and all Muhammadiyah school in Central Java.

Garfield (in Setyaningsih, Lely; 2018), lesson study comes from Japan (jogyokenkyu) which is a systematic process used by Japanese teachers examine the effectiveness of their teaching in order to improve learning achievement. Lesson study is one of the models for fostering teachers through the assessment of learning activities that are carried out collaboratively and sustainably in building a learning community. Lesson study is able to improve teacher competence and liveliness students in learning process.

Abdurrahman (in Sari, Suryaning, et al; 2017), mathematics is a practical symbolic language to express quantitative and spatial relationships, while its theoretical function is to facilitate thinking. Mathematics is often considered by students as difficult and boring lesson. This can be seen in the activity of students and the interaction of students and teachers as well as between students during the learning process. One of ways to create a quality and fun learning is by doing collaboration among teachers through lesson study activity.

Based on these matter, the author thinks that it is necessary to improve learning process for students. It is done in order the students can learn in pleasant atmosphere and increase liveliness of the students in learning process. In addition, it needs a learning model that can create pleasant situation, to eliminate boredom and absorb all materials by all the students. Integrated learning is mixture learning, in this case the author combines 2 subjects, namely mathematics and science in "learning sets through the interaction of living things with the environment".

2. METHOD

The implementation of lesson study is different from a country to another countries. This is adjusted to the problems faced by educators or educational problems faced by a country. So there is a modification of the stages of lesson study. Bill Cerbin and Bryan Kopp (in Subadi, Tjipto: 2010) state that there are six stages in lesson study, namely (1) form a team; (2) develop student learning goals; (3) plan the research lesson; (4) gather evidence of student learning; (5) analyze evidence of learning; (6)) repeat the process. Tjipto Subadi (2010) suggested four stages of lesson study as an effective teacher development model, namely: (1) conducting academic studies, especially analyzing learning problems, both from the aspect of the SK syllabus, KD, indicators, learning objectives, development of teaching materials, development of the use of multiple methods and multi-media as well as the development of evaluation tools; (2) find solutions and make plans in the form of RMP (Learning Quality Plan) centered on student activities; (3) the implementation of learning in the classroom, the teacher as an observer; (4) post-learning discussion to reflect on it.

This activity includes 3 stages, namely (1) planning (plan); (2) implementation (do); and reflection (see) and lasted for 2 cycles. The subjects of the lesson study activities are seventh grade students of Muhammadiyah Plus Junior High School Salatiga in 2021/2022 academic year. The stages of activities are described in Figure 1. The data obtained in the lesson study activities are the results of observations of learning activities in each cycle and documentation.

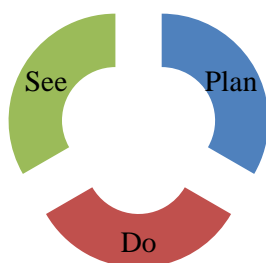


Figure 1. Lesson Study Stages

3. RESULTS AND DISCUSSION

According to Putra (2010) in Sucilestari and Arizona (2019), lesson study is supported by three stages of activities, namely planning (plan), implementation (do), and reflection (see). Based on this, the mathematics and science teacher at Muhammadiyah Plus Junior High School Salatiga carried out lesson study based on these stages. Mathematics and science teachers carry out learning plans in the form of making chapter

designs and lesson designs. The implementation of (do) lesson study at Muhammadiyah Plus Junior High School Salatiga in integrated learning is applied in group learning through the interaction of living things with the environment. Furthermore, there is a reflection on the implementation stages and finding solutions to problems that arise so that the next learning can be done out properly. The activities are described in four meetings as shown in the following table.

Table 1. Four Lesson Study Activities

the meeting	Date	The place	Activity (Plan-Do-See)	Material	Teacher Name Model	Number of teachers present	Activity Results
1	August, 2, 2021	Muhammadiyah Plus Junior High School Salatiga	<i>plan 1</i>	set	Suryaning Fajar Sari	4	<i>chapter design dan lesson design</i>
2	August, 13, 2021	Muhammadiyah Plus Junior High School Salatiga	<i>do-see 1</i>	Learning groups through the interaction of living things with the environment	Suryaning Fajar Sari	4	Established good interaction among students and between students and teachers
3	August, 16, 2021	Muhammadiyah Plus Junior High School Salatiga	<i>plan 2</i>	Empty set, universal set, subset,	Suryaning Fajar Sari	4	<i>chapter design dan lesson design</i>
4	August, 27, 2021	Muhammadiyah Plus Junior High School Salatiga	<i>do-see 2</i>	Learning sets through the interaction of living things with the environment	Suryaning Fajar Sari	4	Established good interaction among students and between students and teachers

Plan-do-see activity 1

Chapter Design pada Himpunan									
No	Materi	Jam	Format Materi Inti Cara Belajar	Sasaran/ Tujuan Pembelajaran	Perhatian dan minat	Keahlian percobaan	Proses berfikir	Mengamati pakam	Cara evaluasi
1.	Macam himpunan	5 Jam	<p>Konsep Himpunan</p> <ul style="list-style-type: none"> Membangun konsep himpunan dengan contoh permasalahan dari kehidupan sehari-hari. Dengan prosedur dari LKS, siswa menarik kesimpulan tentang himpunan dan cara menyajikan himpunan. <p>Macam-macam Himpunan</p> <ul style="list-style-type: none"> Menjelaskan macam-macam himpunan dengan contoh permasalahan dari kehidupan sehari-hari. Dengan menggunakan 	Siswa dapat menjelaskan dan menyelesaikan masalah kontekstual yang berkaitan dengan pensertian himpunan, penyajian himpunan, himpunan kosong, himpunan semesta dan himpunan bagian.	•		•	•	<p>1. Dari himpunan berikut ini manakah yang termasuk himpunan!</p> <ol style="list-style-type: none"> Himpunan bilangan genap dibagi 5 Kelompok siswa yang sholat Kelompok siswa anggota I Kelompok bilangan cacah sampai 10 <p>2. Diketahui $A = \{ \text{bilangan habis dibagi 3 dan kurang dari 10} \}$. Nyatakan Himpunan A dan mendaftar anggota himpunan tersebut dengan notasi pembentuk himpunan!</p> <p>3. Buatlah diagram Venn dari himpunan berikut ini! S adalah himpunan provinsi di Indonesia $K = \{ \text{Jawa Tengah, DKI Jakarta} \}$ L adalah himpunan provinsi di Indonesia</p> <p>4. Jika P adalah himpunan bilangan positif kurang dari 17, manakah diantara himpunan berikut yang merupakan himpunan bagian dari P!</p>
			prosedur dari LKS siswa menarik kesimpulan tentang macam-macam himpunan.						<p>A adalah himpunan bilangan kurang dari 11; B adalah himpunan bilangan lebih dari 6 dan kurang dari 10; C adalah himpunan bilangan kurang dari 17; D adalah himpunan bilangan lebih dari 3 dan kurang dari 10; E adalah himpunan bilangan kurang dari 23.</p> <p>5. Sebutkan himpunan bagian dari Q = {telayan, perahu, jala}</p>
2.	Operasi himpunan	3 jam	<p>Operasi Himpunan</p> <ul style="list-style-type: none"> Mengoperasikan himpunan dari contoh diagram Venn yang diberikan maupun contoh permasalahan dari kehidupan sehari-hari. Dengan menggunakan prosedur dari LKS siswa menarik kesimpulan tentang cara mengoperasikan himpunan. 	Siswa dapat mengoperasikan dan menyelesaikan masalah kontekstual yang berkaitan dengan operasi himpunan yang meliputi irisan, gabungan, komplemen, dan selisih.	•		•	•	<p>1. Diketahui $P = \{ 2, 4, 6, 8 \}$ $Q = \{ 1, 3, 4, 7, 8 \}$ $R = \{ x \mid 1 \leq x \leq 7; x \in \text{bilangan bulat} \}$ Tentukan anggota himpunan $(P \cap R) \cup (Q \cap R)$.</p> <p>2. Dalam sebuah kapal penumpang terdapat 25 awak kapal, di antara awak kapal tersebut 15 orang suka mengonsumsi ikan tuna dan 3 orang tidak suka mengonsumsi ikan tuna. Berapa banyak awak kapal yang suka ikan tuna?</p> <p>3. Dalam sebuah kelas terdapat 21 anak gemar melukis, 14 anak gemar menyanyi, dan 10 anak gemar menyanyi serta 14 anak gemar melukis saja. Berapa banyak anak yang hanya gemar melukis saja?</p>

Figure 2. Chapter design-plan 1

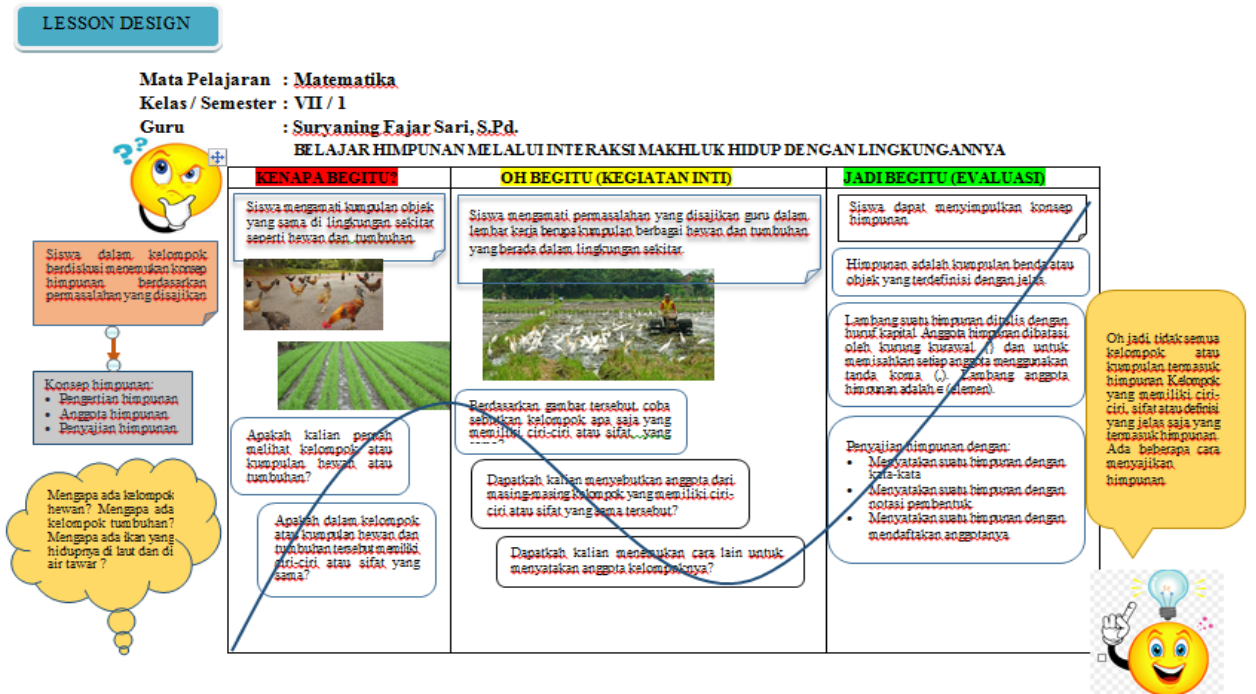


Figure 3. Lesson design-plan 1

Findings by the observer (from direct observation) during the implementation of do-plan 1:

1. The division of groups is heterogeneous, both in terms of ability and gender.
2. When dividing groups through breakout zoom, some students still feel confused because it is first time for them use the method.
3. In general, students who was less active in learning process become active during do-see 1 activities.
4. During the discussion, the collaboration among the students in finding the concept of the set was quite good.
5. There are some students who can't express their opinion and findings.
6. The thinking process of some students has led to the concept of a set.
7. Some students are able to differentiate groups belongs to set and non-set.
8. Some students are able to present the results of the discussion well.
9. The finding of students is appropriate with teacher designed arrangement.

Follow-up activities on the see-1 evaluation activity:

1. For students who are not familiar with breakout zoom, the solution is to give more detailed explanation about grouping technique.
2. Before learning process, the teacher prepares all the possibilities that can occur during learning activities.

Plan-do-see activity 2

Chosen the material in this activity is the set material about empty sets, subsets and universe sets. In the planning activity (plan), there are four teachers make a chapter design and lesson design shown in Figure 4.

Chapter Design pada Himpunan									
No	Materi	Jam	Format Materi Inti Cara Belajar	Sasaran/ Tujuan Pembelajaran	Perhatian dan minat	Kesahlian percobaan	Proses berfikir	Mengamati pakam	Cara evaluasi
1.	Macam himpunan	5 Jam	<p>Konsep Himpunan</p> <ul style="list-style-type: none"> Membangun konsep himpunan dengan contoh permasalahan dari kehidupan sehari-hari. Dengan prosedur dari LKS, siswa menarik kesimpulan tentang himpunan dan cara menyajikan himpunan. <p>Macam-macam Himpunan</p> <ul style="list-style-type: none"> Menjelaskan macam-macam himpunan dengan contoh permasalahan dari kehidupan sehari-hari. Dengan menggunakan 	Siswa dapat menjelaskan dan menyelesaikan masalah kontekstual yang berkaitan dengan pengertian himpunan, penyajian himpunan, himpunan kosong, himpunan semesta dan himpunan bagian	•		•	•	<ol style="list-style-type: none"> Dari himpunan berikut ini manakah yang termasuk himpunan! <ol style="list-style-type: none"> Himpunan bilangan genap yang bisa dibagi 5 Kelompok siswa yang sholih Kelompok siswa anggota IPM Kelompok bilangan cacah antara 2 sampai 10 Diketahui $A = \{ \text{bilangan ganjil yang habis dibagi 3 dan kurang dari 40} \}$. Nyatakan Himpunan A dengan cara mendaftarkan anggota himpunan dan notasi pembentuk himpunan! Buatlah diagram Venn dari himpunan-himpunan berikut ini! S adalah himpunan provinsi di Indonesia. $K = \{ \text{Jawa Tengah, DKI Jakarta, DI Yogyakarta, Kalimantan Barat, NTT} \}$. L adalah himpunan provinsi se-Jawa. Jika P adalah himpunan bilangan bulat positif kurang dari 17, maka nyatakan manakah diantara himpunan-himpunan berikut yang merupakan himpunan bagian dari P!
			prosedur dari LKS siswa menarik kesimpulan tentang macam-macam himpunan.						<p>A adalah himpunan bilangan cacah kurang dari 11; B adalah himpunan bilangan asli yang lebih dari 6 dan kurang dari 21; C adalah himpunan bilangan ganjil yang kurang dari 17; D adalah himpunan bilangan genap yang lebih dari 3 dan kurang dari 10; E adalah himpunan bilangan prima kurang dari 23.</p> <p>5. Sebutkan himpunan bagian dari $Q = \{ \text{nelayan, perahu, jala} \}$</p>
2.	Operasi himpunan	3 jam	<p>Operasi Himpunan</p> <ul style="list-style-type: none"> Mengoperasikan himpunan dari contoh diagram Venn yang diberikan maupun contoh permasalahan dari kehidupan sehari-hari. Dengan menggunakan prosedur dari LKS siswa menarik kesimpulan tentang cara mengoperasikan himpunan. 	Siswa dapat mengoperasikan dan menyelesaikan masalah kontekstual yang berkaitan dengan operasi himpunan yang meliputi irisan, gabungan, komplemen, dan selisih.	•		•	•	<ol style="list-style-type: none"> Diketahui $P = \{ 2, 4, 6, 8 \}$ $Q = \{ 1, 3, 4, 7, 8 \}$ $R = \{ x \mid 1 \leq x \leq 7 ; x \in \text{bilangan Asli} \}$ Tentukan anggota himpunan dari $(P \cap R) \cup (Q \cap R)$. Dalam sebuah kapal pangkutan ikan terdapat 25 awak kapal, diantaranya 12 orang suka mengonsumsi ikan cakalang, 15 orang suka mengonsumsi ikan tuna, dan 3 orang tidak suka keduanya. Berapa awak kapal yang suka ikan cakalang dan ikan tuna? Dalam sebuah kelas terdapat 25 anak gemar melukis, 21 anak gemar menyanyi, serta 14 anak gemar melukis dan menyanyi. Berapa banyak anak yang hanya gemar melukis saja atau menyanyi saja?

Figure 4. Chapter design-plan 2

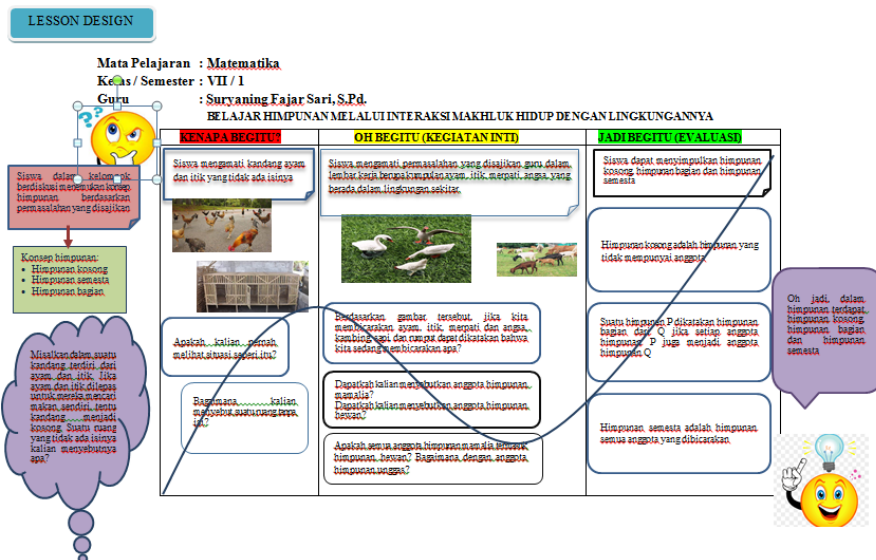


Figure 5. Lesson design-plan 2

Findings by the observer (from direct observation) during the implementation of do-plan learning 2

1. The division of the group through the zoom breakout went well.
2. All students are involved in group discussions.
3. Students are active in the discussion, if there are questions, the students are communicated with the teachers directly.
4. The thinking process of students in finding the concept of empty set, universal sets and subset run well.
5. Some students are able to present the results of group discussions in their own language and the teacher becomes a good facilitator and motivates other students to listen and respond.
6. There is interaction among the students when they responses to other group presentation.
1. Follow-up activity in the “see-plan 2” evaluation activity is the teachers must know and understand that every student has different utterances with the teachers but has similar meanings.

4. CONCLUSIONS AND SUGGESTIONS

Conclusions

The implementation of lesson study in group learning through the interaction of living things with the environment for class VII students of Muhammadiyah Plus Junior High School Salatiga runs well. The teachers get a lot of valuable lesson to increase their competence in teaching learning process. Through this activity, teachers know and learn about chapter design and lesson design, teachers with different subjects can collaborate to produce integrated learning in the classroom, to increase competences futhermore the teachers can develop their abilities in using technology in teaching learning process. On the other side, the teacher also can learn how to be a good and critical observers so that quality of reflection and follow-up to be increased.

Suggestions

This lesson study activity is expected to be held continually so that create a better of learning quality.

5. REFERENCES

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